MINE COUNTERMEASURES (MCM)

A family of Navy and Marine Corps Mine Countermeasures (MCM) systems is being developed and fielded to allow joint/combined sea-based forces to conduct expeditionary operations at a time and place of our choosing, to include terrain defended by anti-access systems such as mines and obstacles. Tactics, techniques, procedures, and material solutions are being developed to support seamless naval expeditionary operations throughout the littoral and beyond.

FROM THE STERN GATE THROUGH THE BEACH

Sea-based forces first require an effective mine countermeasures capability to open and maintain sea lines of communication and to operate within the littoral battle space. The ability to operate in areas defended by enemy mines and obstacles requires a family of capabilities, which includes detection, location, neutralization, marking, and data dissemination. This family of capabilities will allow commanders to detect and avoid mines and obstacles when possible, and breach when necessary.

In conducting Operational Maneuver From The Sea (OMFTS), the Marine Corps relies upon the Navy to maneuver its expeditionary forces to the beach, allowing the deployment and prosecution of operations ashore. Some forces, equipment, and supplies will have to cross the beach regardless of our future vertical-lift capabilities. In specific areas of national strategic interest, the assault force faces challenges in detection and avoidance of littoral waters and landing beaches fouled by mines and obstacles. In these areas of present and future interest, suitable landing beaches are limited—and our potential adversaries know precisely where they are.

The Navy's triad of deep-water MCM capabilities resides in surface mine countermeasure ships, airborne mine countermeasure helicopter squadrons, and underwater mine countermeasure teams consisting of Explosive Ordnance Disposal (EOD) detachments, equipped with Marine Mammal Systems and unmanned vehicles. The MCM triad stands ready to conduct large-area or long-endurance MCM operations from deep water to the 40-foot depth contour.

The Navy is engaged in an effort to augment the triad with MCM systems placed onboard the ships of Carrier and Expeditionary Strike Groups, as well as equipping the Littoral Combat Ships with MCM mission modules. These are designed to provide a self-contained, "organic" capability to detect, avoid, and/or neutralize mines within an operationally acceptable timeline and with acceptable levels of operational risk. This next generation of systems includes the Remote Mine-Hunting System and the Long-Term Mine Reconnaissance System, among others.

The physics of ship-draft requirements, sensor and system operating limits, diver physiology, mine characteristics, and an extremely dynamic environment, combined with the requirement for co-

vert operations and many other factors, limit effectiveness of deep water systems for very shallow water (VSW - 10 to 40 feet deep), the surf zone (SZ - 10 feet to the beach), and Beach Zone (BZ) operations.

In response, the Navy has fielded a specialized family of capabilities to contend with mines and obstacles in these technologically challenging environments. Explosive Ordnance Disposal Mobile Unit 1 (EOD MU 1), formerly known as the Naval Special Clearance Team 1 (NSCT-1), which consists of a 180-man unit composed of Navy EOD, Marine Reconnaissance Divers, and support personnel—fulfills an important part of the requirement. EOD MU-1 employs unmanned underwater vehicles, marine mammals, and divers to conduct low-visibility mine exploration, reconnaissance, and clearance operations in waters from 600- to 10- feet deep. Data collection devices such as the Coastal Battlefield Reconnaissance and Analysis (COBRA) System will provide the Navy and Marine Corps with essential visual reconnaissance information on mine lines and SZ/BZ defenses. The Navy's science and technology effort is also investigating the effectiveness of precision-delivered Joint Direct Attack Munitions (JDAM) against certain SZ/BZ mines and obstacles. The JDAM Assault Breaching System (JABS) capability provides an SZ/BZ MCM obstacle breaching capability.

In the far-term (fiscal year 2012 and beyond), the science and technology endeavor is pursuing "smart" bomb- and gun-delivered munitions designed to destroy concentrations of SZ/BZ mines. This includes the Navy's Counter Mine System (CMS) which uses a spray of small darts to neutralize mines in the beach and surf zones. This promising technological approach offers the potential for standoff operations and the removal of men and mammals from the minefield—two key MCM goals.

THROUGH THE BEACH AND BEYOND

Once ashore, naval expeditionary forces must be capable of detecting, breaching, clearing, proofing, and marking mines and obstacles, and of disseminating mine and obstacle data. From the critical Navy-Marine Corps handoff in the vicinity of the beach exit to the force objectives and beyond, Marine Corps commanders must be able to detect and avoid ground mines and obstacles when possible, and breach them when necessary. The Marine Corps' current inventory of MCM systems includes the AN/PSS-14 Mine Detector (which utilizes ground penetrating radar to locate mines), explosive breaching systems- the Assault Amphibian Vehicle with Mk154 Triple-Shot Line Charge, Mk155 Mine Clearing Line Charge (MICLIC), and Anti-Personnel Obstacle Breaching System (APOBS)—and mechanical breaching/clearing/proofing systems (M1 tank with track-width mine plow and armored D-7 dozer). In aggregate, these systems provide a limited and aging deliberate breaching capability. They do not meet

the detection, speed, and responsiveness requirements of the modern battlefield.

Two acquisition programs promise to significantly improve Marine Corps MCM capabilities:

- Advanced Mine Detector (AMD) With an Initial Operational Capability of fiscal year 2008 and Full Operational Capability of fiscal year 2009, AMD will employ ground penetrating radar technology to detect buried anti-personnel and anti-tank mines. This is a key capability in light of the worldwide proliferation of low and non-metallic mines

- Assault Breacher Vehicle (ABV) With an Initial Operational Capability scheduled for fiscal year 2009, ABV will be a single-platform mine-field breaching/clearing/proofing/marking system that possesses the speed and mobility of modern mechanized forces. Combining two Mk155 Line Charges, a Full-Width Mine Plow, and a breached lane marking system on an M1 tank chassis, the ABV will offer deliberate and "in-stride" breaching capabilities—allowing commanders to maintain initiative and momentum.

MCM doctrine, training, and equipment are continuously evolving to cover capability gaps, replace obsolete equipment, and meet the challenges posed by newer threats, such as Improvised Explosive Devices (IEDs), off-route mines, and anti-helicopter mines.

Current Marine Corps MCM systems face challenges in providing force commanders with the desired "in-stride" capability to achieve and maintain initiative and momentum in a full spectrum anti-access environment. The Marine Corps developed its own MCM master plan, designed to fill remaining capability gaps and provide a road map for the future, which was implemented in 2004.

MCM FOR THE GLOBAL WAR ON TERRORISM

Operations in the Global War on Terrorism require the fielding of systems designed to remotely detect IEDs and mine-initiated ambushes to ensure the mobility of the MAGTF while ashore. Testing on many technologies to locate off-route, semi-buried mines and IEDs is currently underway, in conjunction with the Joint Area Clearance Advanced Concepts Technology Demonstration office. Considering the threat faced in the GWOT, the Marine Corps has aggressively pursued the Mine Resistant Ambush Protected (MRAP) vehicle to protect Marines operating in a high threat environment. As of October of 2007 more then 450 vehicles had been deployed to the U.S. Central Command (USCENTCOM) area of operations. These vehicles have already proven their worth by saving the lives of several Marines.